

The book is provided with a large number of blocks in the text, nearly all maps, in which, with very few exceptions, but one method of representing relief is adopted—that of shaded areas bounded by contour lines. The method is valuable for some purposes, but as a means of representing the form of the ground is, in most cases, inferior to the much abused “caterpillar” method of delineation, and frequently conveys a misleading impression. The figure intended to represent the lower Brahmaputra valley and Gangetic delta is an instance of this, while that intended to represent the orography of the Hindu Kush looks more like an ink-maker’s advertisement. In the coloured maps the complete absence of hill shading gives to the Thibetan plateau an air of flatness which it is far from possessing in reality, yet it would be unfair to conclude this notice without a word in their praise. Mr. Bartholomew has accustomed us to a high standard of workmanship, but his map of India, reproduced in this book, has seldom been equalled for intricacy and accuracy of colour printing, and for success in showing the leading features of the relief of the land.

#### PHYSICAL AND PHYSIOLOGICAL ASPECTS OF LIGHT.

*Light Energy; its Physics, Physiological Action, and Therapeutics.* By Margaret A. Cleaves, M.D. Pp. xiv+827. (London: Rebman, Ltd., 1904.) Price 21s. net.

WHILE this book is written primarily to further our knowledge of the properties and uses of that form of energy called light, in the treatment of disease, yet it will be found of great interest to those whose study is mainly confined to the purely physical aspects of light phenomena. The subject is treated from the modern view of energy in the form of waves of a certain length and direction, but at the same time the emission theory is not entirely ignored on account of the peculiar behaviour of some of the recently discovered radio-active substances, notably radium. About 130 pages are devoted to a description of the various kinds of rays, their origin and physical properties. The part dealing with the electric arc is very complete and clear, and embraces all one could wish to know to ensure an intelligent application of the arc lamp in the treatment of disease.

Following this is a series of chapters dealing with the action of light on the various forms of life, from the most elementary to the highly complex human subject. In this section the action of light from both natural and artificial sources is treated very thoroughly. It is quite evident that the author has devoted herself to a large amount of painstaking experiment, the valuable results of which are recorded in the present volume. According to her, the mercury vapour lamp has not justified the expectations regarding it as a therapeutic agent.

The second half of the book is taken up with the therapeutic applications of the various forms of light. This part will be of special interest to medical men, especially those who are engaged in this line of work.

Sun, arc, and incandescent light baths are treated most fully, together with their use in those diseases in which the author has found them respectively useful. The indications are, in every instance, based on spectroscopic analysis, and full details of the proper technique are given for every variety of application. Several forms of bath cabinet are described, as well as arc and other lamps for local treatment with concentrated light.

While the author is rather emphatic on the necessity for employing lamps of large amperage—quantity being as essential as quality—yet she speaks highly of certain small lamps the efficiency of which was such as to necessitate their replacement by lamps of greater power in the light department of the London Hospital. The reason for this praise is seen, later on, to be related to the comparative cost of the lamps—the smaller being sold and maintained at a fraction of the cost of the Finsen, and their efficiency is at least in proportion to this cost. According to the author, the great advantage of a lamp of high amperage, like the Finsen, is that we get not only the short and high frequencies of intense chemical activity, but also the frequencies of long wave-lengths having great amplitude and penetrability—a combination which is essential to ensure the best success. In the smaller lamps these long wave-lengths of great amplitude are not present in such abundance because of the lesser amperage and smaller carbons. The results which the author has obtained in many diseases not generally subjected to light treatment will come as a surprise to those who have not kept closely in touch with modern light therapeutics.

The applications of the various coloured lights, as also those of the invisible spectrum rays, are fully discussed. A short chapter is given to the consideration of *n*-Rays and one to the Alpha, Beta, and Gamma rays of radio-active substances, their physical properties, actions, and therapeutic uses. An interesting chapter is that on fluorescence, fluorescent stimulation, and sensitisation of tissues, and the book closes with a chapter on the pernicious effect of sunlight and the pathological effects of electric lighting. The book can be confidently recommended. It will be found of great interest to most students of natural science.

REGINALD MORTON.

#### A BOOK ON INK.

*Inks: their Composition and Manufacture.* By C. Ainsworth Mitchell, B.A. (Oxon.), F.I.C., and T. C. Hepworth. Pp. xiv+251; with 46 illustrations, including 4 plates. (London: Chas. Griffin and Co., Ltd., 1904.) Price 7s. 6d. net.

*LITERA scripta manet*; but the permanence of the writing depends upon the quality of the ink. Certain papyri of ancient Egypt, now deposited in the British Museum, contain the earliest ink-written records so far brought to light. A roll dating from 2500 B.C. still bears decipherable characters, and fragments of papyri have been found by Prof. Flinders Petrie in a tomb to which the date 3500 B.C. is ascribed. If the origin of the use of ink is lost in antiquity, at

least one thing is certain—the writing-fluid used by the ancient scribes for such records as the foregoing must have possessed in a high degree the property of durability.

In one form or another, the basis of these early writing-fluids was carbon. For example, Chinese ink, the so-called “Indian” ink of the modern artist, which according to the native historians has been made since 2600 B.C. or thereabouts, was at first a vegetable varnish, and later a mixture of lampblack and glue. Inks containing gallate of iron did not come into use until a much later period. Thus Sir Humphry Davy, examining some documents recovered from the ruins of Herculaneum, “looked in vain amongst the MSS. . . . for vestiges of letters in oxide of iron,” and he concludes that the Romans up to the time of Pliny had never used “ink of galls and iron” for writing purposes. Gradually, however, in the early centuries of the Christian era, there came a transition from carbon inks to those containing iron; and Blagden, in “Some Observations on Ancient Inks,” communicated to the Royal Society in 1787, records that the writing fluid employed in various MSS. on vellum, dating from the ninth to the fifteenth centuries, was an iron and gall ink. Somewhat earlier than the date of Blagden’s paper logwood began to find employment as a constituent of inks, and soon after the middle of last century came the next notable modification, namely, the use of aniline dyes in the manufacture of both black and coloured writing-fluids.

Of these and other matters bearing upon the history, composition, and methods of preparing the various kinds of inks, Messrs. Mitchell and Hepworth have much to tell us in the volume under notice. They have brought together, and made convenient for reference, material that has been hitherto chiefly scattered amongst periodicals and isolated dictionary articles. In so doing they have saved their contemporaries some labour, and earned for themselves much gratitude.

The book is divided into three sections. The first of these deals with writing inks, including those of which carbon, tannin, logwood, and aniline respectively form the characteristic ingredients. It comprises chapters upon the sources of the tannin materials, the chemical nature of iron-gall inks, and the best methods of examining both the fluid itself and the characters on the written page. Printing inks form the subject of section ii., in which an interesting chapter treats of colour work, including three-colour printing and inks for use in the production of cheques and bank-notes. In the concluding section there is a description of inks intended for miscellaneous purposes; these comprise copying, marking, safety, and sympathetic inks, and fluids for writing on glass, wood, ivory, or leather. Many formulæ are given, some of which the authors have personally tested, and the work closes with a list of English patents relating to the subject.

Despite occasional incoherency of style, the two collaborators have produced a useful and attractive little volume. One or two slips may be pointed out; thus the equation on p. 101 is incomplete, and the

specific gravity of dilute hydrochloric acid is given wrongly on p. 208. In the historical introduction we are told, *apropos* of a certain document (p. 11), that “it was probably written at the end of the sixteenth century by a man past middle age, who learned to write just about the time that Shakespeare was born (1504).” At first it seems an unnecessarily cautious understatement to call such a man “past middle age,” but a little reflection shows that it is those kittle cattle the figures that are to blame.

The book is a serviceable addition to the literature of chemical technology. C. SIMMONDS.

#### OUR BOOK SHELF.

*Naturbegriffe und Natururteile.* By Hans Driesch. Pp. viii+239. (Leipzig: Wilhelm Engelmann; London: Williams and Norgate, 1904.) Price 4s. net.

THIS book deals chiefly with three topics. Starting on a Kantian basis, it seeks to state the *a priori* principles of pure physical science. (*A priori* is conveniently defined as “independent of the amount of experience.”) Next, the leading principles of “energetics” are discussed, and their relation on the one hand to the *a priori* principles of pure physical science, and on the other hand to the ordinary laws of thermodynamics. Incidentally, the “laws” of conservation (of substance and the like) are examined, and entropy has a good deal of attention. Last of all the results attained are carried over to a discussion of biology. The point of view is neo-vitalistic. It would be hazardous to say that the author has run to earth the  $x$  which is the object of all our search, the vital principle or whatever other name may be applied to it; the term which he uses is the blessed word *entelechy*.

Herr Driesch is well known to be at his best a clear, original and suggestive writer. Much of the present work is excellent, but we doubt if the last eighty pages are either clear or convincing. Perhaps one would require to read the author’s other works in order to accustom oneself to his point of view and his independent modes of statement. He is occasionally unsatisfactory as well when dealing with the theories of others, for example, with Prof. Clerk Maxwell’s “sorting demon.” The discussion occurs under the heading “Declarations of Physicists regarding Biological Subjects,” and Herr Driesch almost seems at times to suppose or to imply that the conception may have been formed in order to limit the second law of thermodynamics to inanimate bodies. True, Lord Kelvin’s statement of the second law has the words “in inanimate material.” But Lord Kelvin’s declaration is explicit (“Popular Lectures and Addresses,” 1889, vol. i. p. 141):—“The conception of the ‘sorting demon’ is merely mechanical and is of great value in purely physical science. It was not invented to help us to deal with questions regarding the influence of life and of mind on the motions of matter.” On p. 103 the accurate reference to Helmholtz’s work is—Ostwald’s *Klassiker* Nr. 124, p. 30, Anm.

*Higher Text-book of Magnetism and Electricity.* By R. Wallace Stewart, D.Sc. Being vol. iv. of “The Tutorial Physics.” Pp. viii+672. (London: W. B. Clive, University Tutorial Press.) Price 6s. 6d.

WE have several times noticed this work as successive editions have appeared, and can speak as appreciatively of it as we have on other occasions. The present volume is based on the older one, but it has been wholly